

REMARKS

Claims 1-22 are pending in the application. With this amendment claims 1-3, 10, 11, 15, and 17-22 have been cancelled, and claims 23-36 have been added with this amendment. All of the claims remaining in the application relate to a polymer composition comprising a chlorine-containing or bromine-containing polymer and an organic thiol compound. Claims relating to organic thiol compounds per se have been cancelled with this amendment.

The specification is objected to on page 4, lines 16 and page 5, lines 1-2 as the Examiner states R^2 cannot be alkyl, but instead has to be an alkene. It is respectfully submitted that R^2 is correct as described. Even though R^2 is substituted with a thiol group, the name of the substituted R^2 would be a mercapto alkyl such as mercapto ethyl. Attached to this amendment is a copy of page 91 from Organic Chemistry by L. G. Wade, Jr., Fourth Edition. The naming of complex alkyl substituents is described at the bottom of page 91. As shown by the four examples, the substituted alkyl group is referred to as propyl or butyl groups respectively even though they are substituted with additional alkyl groups such as ethyl, methyl or the like. Accordingly, it is respectfully submitted that the rejection to the specification and claims is moot.

The specification has also been objected to by the Examiner specifically on page 17, line 27 and on page 18, lines 3, 4 and 15. The Examiner states that R^3 , R^4 , R^5 , R^6 and R^7 cannot be aliphatics or alkyls. The claims have also been rejected under 35 U.S.C. §112, first paragraph for the same reasons as objected to in the specification.

Each R group will be specifically discussed herein. In order to clarify the description of R^3 and R^5 in the specification and the claims, the definition thereof has been amended to state that R^3 and R^5 are alkenyls. The term "alkenyl" properly describes the use of R^3 when x is greater than 1 and R^5 as multi-valent radicals in the structures shown. R^4 , R^6 and R^7 are properly characterized as alkyl

groups for the same reason as described above with respect to R². Accordingly, the description in the specification and claims regarding R⁴, R⁵ and R⁷ has not been amended. It is respectfully submitted that the Examiner's rejection to the specification and the claims under 35 U.S.C. § 112 has been overcome.

Claims 4-18 have been rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. The Examiner states that the term "metal-based" is indefinite and that "metal-containing" is suggested. While it is respectfully submitted that one of ordinary skill in the art understands the term "metal-based" and the same is not indefinite, the claims have been amended as suggested by the Examiner to further clarify the invention. It is respectfully submitted that this objection has been rendered moot by the amendment to the claims.

Claims 1-3 and 19-22 are rejected under 35 U.S.C. § 103(a) and 35 U.S.C. § 102(b) in view of various references. Inasmuch as these claims have been cancelled, no discussion of the cited references is necessary.

Claims 4-16 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Lindsey, U. S. Patent No. 3,242,133, Davenport, U. S. Patent No. 3,652,733, Sakai Chemical Industries, JP-63-241055, or Henkel KgaA DE 32 47 736.

It is respectfully submitted that the cited references cannot teach or suggest the present invention as claimed. Each of the references will be discussed hereinbelow with respect to the pending claims.

The Lindsey reference relates to the stabilization of polyvinyl halide resins utilizing a combination of a terpene compound and a sulfur containing compound which optionally can contain a thiol group. Independent claim 4 relates to a polymer composition comprising a chlorine-containing or bromine-containing polymer and a stabilizer component consisting of an organic thiol compound and optionally epoxidized soybean oil. Accordingly, independent claim 4 excludes

utilizing in combination with an organic thiol the terpene stabilizers disclosed in the Lindsey reference. Thus, it is respectfully submitted that claims 4-16, 23 and 24 are novel in view of the Lindsey reference. There is no teaching or suggestion within the Lindsey reference for the utilization of the specifically claimed organic thiols as a sole stabilizer component, or optionally with the inclusion of epoxidized soybean oil to stabilize a chlorine-containing or bromine-containing polymer. In fact, Lindsey states in column 1, lines 57-70 that the combination of at least one terpene compound and a sulfur-containing compound are used to stabilize the halogenated polymers.

Regarding new claims 25-36, a polymer composition comprising the chlorine-containing or bromine-containing polymer and specific organic thiol compounds containing at least one thiol group and at least two ester groups is claimed. As noted by the Examiner, the Lindsey reference sets forth a laundry list of sulfur-containing compounds, only some of which contain thiol groups. It is respectfully submitted that out of the complete list set forth in column 3, lines 24-42 and the examples, only 2 di-ester containing aliphatic thiols are disclosed. There is no teaching or suggestion within the reference that any of the listed stabilizers can be utilized free of the terpene compound to provide stabilization for a halogenated polymer. Independent claim 25 specifically excludes the di-ester organic thiol mentioned in Example 16 of Lindsey. Moreover, it has been unexpectedly found by the Applicant that aliphatic organic thiols having di-ester groups thereon as claimed, and not just any organic thiol can beneficially act as stabilizers for halogenated polymers and can be used alone. As the Applicant has shown in Example 3 on page 21 the aliphatic thiol, 1-dodecanethiol results in extensive degradation when utilized alone in PVC, yet this organic thiol is suggested for use in the Lindsey reference.

It is respectfully submitted that one of ordinary skill in the art would not be led in the direction the Applicant has taken upon reading the Lindsey reference.

First, there is no teaching or suggestion for utilizing a sulfur-containing organic compound as a stabilizer without utilizing in the synergistic combination with the terpene compounds. Furthermore, the Lindsey reference sets forth an extremely broad group of sulfur-containing organic compounds which can be utilized in combination with the terpene compound. The list of such thiols in column 3, lines 24-42 contains over 30 different thiols. One of ordinary skill in the art would not be led to choose the Applicants' specifically claimed aliphatic di-ester organic thiols.

The Davenport reference relates to thermoplastic polymer compositions containing a polymerizable plasticizer such as diallyl phthalate, and a polythiol. The polythiol as stated in column 2, lines 25-46 is preferably an ester of a thiol-containing acid and a polyhydroxy compound having 2 to 6 hydroxyl groups. As stated in column 1, lines 57-66, the purpose of the polythiol in the composition is to provide crosslinking sites through the reaction of the polythiol with the polymerizable plasticizer to produce thio-ether links. There is no teaching or suggestion with the Davenport reference to utilize the polythiol, especially the specific organic thiol compounds claimed in the present invention as a stabilizer for uncured chlorine-containing or bromine-containing polymer. Moreover, as stated in column 3, lines 12-21 of Davenport, if it is desirable to include a heat stabilizer, generally from 0.5 to 5 weight percent of a metal-based stabilizer such as lead carbonate, lead acetate, etc. is utilized in the polymer composition.

Accordingly, independent claim 4 cannot be taught or suggested by the Davenport reference as the claim is limited to a stabilizer component consisting of the claimed organic thiol compounds. Independent claim 25 cannot be taught or suggested by the Davenport reference as none of the claimed organic thiols are taught by Davenport.

The Sakai reference relates to chlorinated polymer compositions which utilize pentaerythritol based thiols as stabilizers. Independent claim 4 has been amended

to claim only di-ester organic thiol compounds wherein x is 2 as particularly illustrated by Formulae III and IV on page 18 of the application. Accordingly, the Sakai reference is not pertinent and cannot teach or suggest the polymer composition claimed in independent claim 4. Independent claim 25 is also limited in the same manner as independent claim 4 and is also novel in view of the Sakai reference.

The Henkel reference DE 32 47 736 relates to PVC molding compositions which are stabilized with a combination of a metal-based stabilizer as well as a mercapto succinate-based organic thiol or an alkyl mercapto succinimide compound. As at least stated on page 6 of the reference cited by the Examiner, second full paragraph beginning on line 20, the polyvinyl chloride formulation contains a primary stabilizer which is metal-containing and a co-stabilizer which is succinate-based. Furthermore, Tables I and II of the examples section always include at least one primary metal-containing stabilizer such as zinc stearate, calcium stearate, sodium zeolite, or sodium calcium zeolite.

Accordingly, the Henkel reference cannot teach or suggest the polymer composition claimed in independent claim 4 wherein a chlorine-containing or bromine-containing polymer is stabilized by a stabilizer component consisting of the specifically claimed organic thiol. Moreover, independent claim 25 cannot be taught or suggested as it is claimed that the polymer composition is free of a metal-containing stabilizer.

Respectfully submitted,

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